ISLANDS FOR WEATHER FORECASTING PURPOSES.

THE aim of meteorology from a practical point of view is the forecasting of the amount of rainfall and the approach of storms.

The former will tell us whether we may expect high river flows producing floods and much damage, an average amount of water for successful crop production, or a deficiency of rain which might result in a disastrous drought and possibly a famine. In the case of storms, a means will be afforded of saving many lives and ships, and also, probably, much property ashore.

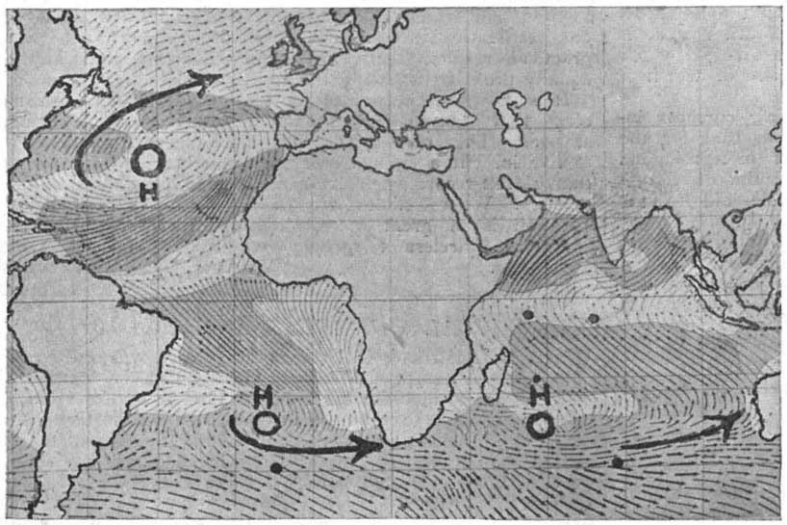

FIG. 1.—The wind system during summer in the northern hemisphere and winter in the southern hemisphere. The black dots represent islands, and the letter H the centres of regions of high pressure or anticyclonic areas.

The study of the weather, therefore, should be fostered to its fullest extent, and every advantage should be taken of means which will bring us nearer the goal of satisfactory forecasting.

Investigations carried out during the last decade have indicated the importance of each weather bureau extending its area of inquiry beyond the region for which it is making its forecasts. Needless to say, many of these institutions have for some years been in telegraphic communication with outlying stations. Thus, for instance, the Indian Meteorological Service receives information from a station so far distant as Mauritius, while the U.S. Weather Bureau utilises valuable observations by telegraph from stations in the West Indies, Azores, Europe, &c.

It is important to bear in mind that rain-bearing winds are those that have passed over large stretches of water, and that the rainfall of a country is deficient or well supplied with this commodity according to its geographical position in relation to the oceans or inland seas, mountain ranges, and the prevailing winds. It is for these reasons that the nearer the coast is approached from the centre of any continent, the greater becomes the rainfall. Thus, for instance, the interior of Australia, the Sahara, the Arabian Desert, Tibet, &c., are all very dry areas.

For forecasting purposes, therefore, attention should be, and in many regions is, paid to the region from which the prevailing winds come, due consideration being given to the particular barometric system of which the wind forms part.

From the above the important functions of islands conveniently situated become obvious. It is not, however, every country bordering on the ocean that is blessed with such an island in the direction of the prevailing wind, and the British Isles, in consequence, suffer very much from this very defect. In Great Britain the main rain-bearing wind is that from the south-west. In summer this forms part of a large anticyclonic system situated in mid-Atlantic towards the south-west (see Fig. 1), while in winter it is a portion of a cyclonic system the centre of which is near Greenland (see Fig. 2). With no islands in the track, the only meteorological information that is at once useful is that which can be gathered from messages sent by the Marconi system of wireless telegraphy from steamers *en voyage*. British weather forecasters are thus undoubtedly heavily handicapped by the lack of some permanent outlying source of information in this region.

Mention has already been made of the use of islands by the United States and India. The latter is particularly fortunate, for Mauritius, Seychelles, Chagos (marked with dots in the figures), and other islands are all conveniently situated to render information if necessary.

Another region which very probably would gain considerably by utilising observations made at island stations is South Africa.

In a previous number of this Journal (vol. lxxi. p. 342, February) Mr. E. Hutchins, Conservator of Forests, Cape Town, gave an excellent account of the general weather conditions in this region. He pointed out that South Africa lies on the border of the south-east trade area. In summer, from Cape Town to the Zambesi, the country comes entirely under the influence of the south-east trade winds. In winter, on the other hand, the southern portion of Cape Colony is subject to "another type of weather, due to the passage of storms from the South Atlantic, the

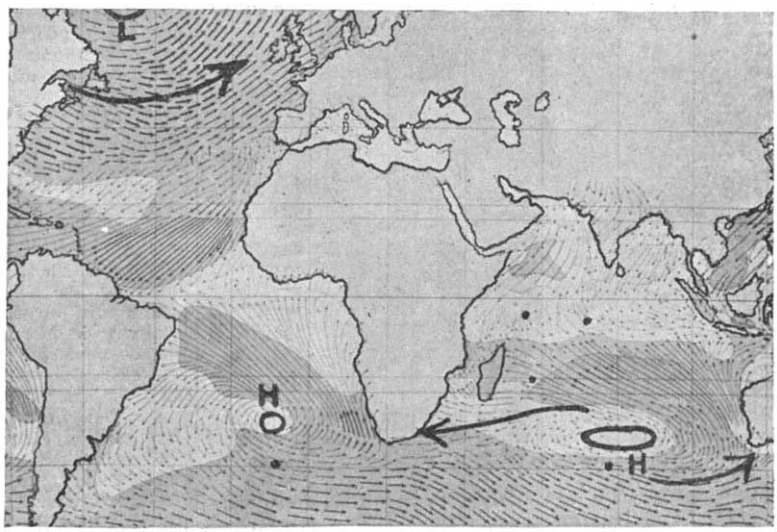

FIG. 2.—The wind system during winter in the northern hemisphere and summer in the southern hemisphere. Notation as in Fig. 1. The letter L indicates the centre of a low pressure or cyclonic area.

'roaring forties' of mariners." He further directs attention to the need of distinguishing between these two weather systems, which play distinct parts in the meteorology of this region. A study of the accompanying two figures will indicate the importance of the islands of Tristan d'Acunha and Gough (indicated by a black dot towards the south-west), and also of Mauritius (the dot east of Madagascar). The two former islands lie in the wind system pertaining to the anticyclonic (high-pressure) area on the west, the centre being indicated by the letter H, while Mauritius, situated to the east of South Africa, is in the south-east trade area in the system formed by the high-pressure (anticyclonic) region, the centre of which is marked also with an H.

By observing the general trend of the air currents indicated by the large arrow, it will be seen that for the winter season in South Africa (Fig. 1) meteorological observations made in either Tristan d'Acunha or Gough Islands would undoubtedly render valuable aid to the weather forecasters.

In the case of the summer months (Fig. 2) there is no conveniently placed island that could furnish equal assistance, but it seems very possible that use could be, and most probably has been, made of the observations at Mauritius for determining the strength of the south-east trade current which impinges on the African coast at this time of year. For forecasting purposes Mauritius, and possibly Rodrigues, would have greater value for regions further up the African coast.

Unfortunately, the Amsterdam and St. Paul islands (marked with one dot) lie too far south and east to serve as useful outlying stations for South Africa. On the other hand, these islands should be undoubtedly utilised by the Australians.

An examination of the accompanying figures indicates the relative positions of the Australian continent and this large southern Indian Ocean wind system. These islands will thus be seen to be right in the track of the current which strikes the south and west coasts of Australia, and should form ideal out-stations for gauging the general condition of this wind system.

That the prevailing winds on the west coast of Australia come from a southerly direction is indicated in the following table, which gives the number of times the wind has blown from each point of the compass at the Perth Observatory during the year 1902, the readings being taken eight times a day :—

N.	98
N.N.W.	51
N.W.	73
W.N.W.	67
W.	92
W.S.W.	113
S.W.	232
S.S.W	432
S.	425
S.S.E.	245
S.E.	194
E.S.E.	121
E.	157
E.N.E.	139
N.E.	159
N.N.E.	98

Another table shows that the resultant direction of the wind, at the same observatory for the same year, was south for the months January to April and October to December inclusive.

There seems every reason, then, to hope that the utilisation of information from one of these islands for several months in the year would in time amply repay the initial cost and maintenance of the station.

It is not without interest to remark that the air current which passes the west coast of Australia in July (that is, in winter in Australia) becomes later the south-east trade wind of the Indian Ocean, and eventually reaches the Indian area in the form of the south-west monsoon in the summer months of the northern hemisphere. In the months about July, Western Australia is thus apparently closely connected, meteorologically speaking, with India, but in the months about January the connection is between Australia and South Africa.

The natural deduction to be made from the above is that the meteorological services of all these countries should be closely in touch with each other. Their combined efforts will certainly considerably increase our knowledge of the meteorology of this vast region, and each will benefit by this mutual interchange of information.

Although mention has only been made of one or two instances in which the employment of islands as meteorological stations would most probably be rewarded with practical results, there are other countries that might equally profit by adopting the same principle.

It is, however, important for the study of world meteorology that many islands should be employed as observing stations. They may not be very ideal places for observers to live in, but a change every few months, and the adoption of self-recording instruments, would possibly simplify matters. Where cables are lacking, and the island in question is of great meteorological importance to some continent, wireless telegraphy might be employed with advantage. WILLIAM J. S. LOCKYER

AN OPTICAL CONGRESS AND EXHIBITION.

THE aims of the optical convention, which was opened at the Northampton Institute, Clerkenwell, on Tuesday, May 30, are to increase the interest taken in optical science in this country, to promote an improvement in technical education in optical matters, and to aid the development of the British optical industry. In his address, the chief part of which is subjoined, the president, Dr. R. T. Glazebrook, F.R.S., after explaining the origin of the proposal to hold a convention, and the steps taken to realise it, gives an outline of the history of optical progress during the past two hundred and fifty years with the view of illustrating the close union which has existed between theory and practice at times of marked progress, and of showing how each has reacted on the other in assisting this progress. The programme of the convention includes meetings for papers and discussions, which will be subsequently published in a volume, and an exhibition of optical and scientific instruments of British manufacture, with a catalogue which is intended to serve as a work of reference illustrating the productions of opticians in this country. A description of some of the exhibits follows the president's address abridged below; and an article on the nature and matter of the papers and discussions will appear in these pages after the close of the convention.

PROGRESS OF OPTICAL SCIENCE AND MANUFACTURES.[1]

The study of optics is a fascinating one, and its history full of interest. I do not propose to-night to attempt to cover the whole ground, but to ask you to look at one or two special periods during which, it seems to me, theory and practice reacted on each other in a marked manner, and to consider what lessons we may draw as to the relation which should in these days of ours subsist between the two.

For this purpose I might go back to very early days. Ptolemy in his attempt to discover the laws of refraction —and wonderfully good the attempt was, as we know now —Archimedes with his burning glass, if, indeed, he ever made it, had both practical aims in view. But we will start to-night nearer our own time. The end of the seventeenth century is such a period. The telescope was invented about 1608, the microscope at rather an earlier date, about 1590, both, probably, in Holland.

Galileo, hearing of this, made his first telescope in 1610. In 1611 Kepler, in his "Dioptrica," described the astronomical telescope with one or more convex lenses as the eye-piece; with this exception, up to Descartes's book on "Dioptrics" in 1637, no other form of telescope but Galileo's was known. The law of refraction was first enunciated by Snell in 1621.

Thus by the year 1660 the importance of the telescope to the astronomer was fully appreciated, and its limitations were being realised. In 1663 Gregory published an account

[1] From the inaugural address delivered before the Optical Convention on May 30 by the president, Dr. R. T. Glazebrook, F.R.S.